

REMARKS/ARGUMENTS

Claims 10-15 have been cancelled from the application, and new claim 16 has been added to the application. Claims 1-9 and 16 remain pending in the application.

The rejections raised in the Office Action are addressed as follows.

Claim rejections under 35 U.S.C. 112

The Examiner rejected claim 15 for being indefinite. In view of the cancellation of claim 15 from the application, Applicant submits that the Examiner's rejection to claim 15 is now moot.

Claim rejections under 35 U.S.C. 103

The Examiner rejected claims 1-7 under 35 U.S.C. 103(a) as being obvious in view of U.S. Patent No. 6,788,157 (Clarke). More specifically, the Examiner alleges that a person with ordinary skill in the art would modify the regenerative divider circuit taught by Clarke to have two mixers, two filters, and a divider for generating in-phase and quadrature phase signals.

Applicant respectfully disagrees, and submits that a person skilled in the art having Clarke would not be motivated to modify the regenerative divider circuit shown in Clarke to have two mixers and two filters for generating in-phase and quadrature phase signals. As the Examiner is aware, the presence of some suggestion or motivation to modify Clarke is one of three criteria required for establishing a *prima facie* case of obviousness. Applicant hereby submits that there is no motivation by one of ordinary skill in the art to modify Clarke.

Figure 1 of Clarke is a block diagram of a receiver including the regenerative frequency divider 116, which is shown in Figure 2. Figure 3 of Clarke clearly shows a quadrature signal generator 142 receiving POS and NEG signals from a divider chain 300. Quadrature generator 142 corresponds to block 142 in Figure 1, while divider chain 300 is described as including the frequency divider 116 and the integer divider 118 shown in Figure 1.

Applicant submits that the regenerative divider circuit 116 could not include a second mixer or second removal means for generating in-phase and quadrature signals because in-phase and quadrature signals are generated by quadrature generator 142 as shown in Figure 3. An ordinary person skilled in the art would understand that Clarke intended for generation of the in-phase and quadrature signals outside of the regenerative divider 116. In contrast, the circuit recited in claim 1 of the present application recites that the in-phase and quadrature signals are generated within the loop of the claimed synthesizer circuit.

Clarke even states technical advantages for his regenerative frequency divider 116, integer divider 118 and quadrature generator 142, at column 7 lines 6 to 15. Clarke states that the regenerative frequency divider 116 and the integer divider 118 each provide an improvement of 3dB in the phase noise of the output signal, and the inclusion of a divide by 2 block in the quadrature generator 142 further provides an additional 3dB improvement in the output signal phase noise. With such advantages conferred by the circuit, Applicant submits that an ordinary person skilled in the art would have no motivation to modify the Clarke regenerative frequency divider 116 to generate in-phase and quadrature signals directly, thereby losing the benefits taught by Clarke.

Therefore, for the reasons stated above, Applicant submits that claim 1 cannot be obvious in view of Clarke as there is no motivation for an ordinary person skilled in the art to modify Clarke and arrive at the invention recited in claim 1.

Notwithstanding the absence of motivation as outlined above, Applicant further submits that Clarke fails to disclose all the features recited in claim 1. Claim 1 recites that the first removal means and the second removal means provide a cos oscillator signal as one output and a sin oscillator signal as another output. Looking at the embodiment of Figure 3 by example only, the outputs of claim 1 can be analogous to the outputs of filters 44 and 48.

In contrast, the regenerative frequency divider 116 of Clarke provides an output signal from mixer 124 and not from the output from filter 128. The advantage of the claimed configuration is that the removal means removes harmonics produced by the preceding mixer. In the circuit of Clarke however, any harmonics introduced by mixer 124 is provided directly to integer divider 118. Therefore, Applicant submits that Clarke fails to meet a second criteria to show *prima facie* obviousness of claim 1, as the claimed output provided by the removal means is not shown or described in Clarke.

Therefore, Applicant submits that claim 1 cannot be obvious in view of Clarke, and withdrawal of the Examiner's rejection under 35 U.S.C. 103 is respectfully requested.

Rejections to Claims 10 to 15 Under 35 U.S.C. 103

In view of the cancellation of claims 10 to 15 from the application, the Examiner's rejection to claims 10 to 15 are therefore moot.

New Claim 16

Applicant takes the opportunity to add new claim 16 to the application. New claim 16 recites the features of claim 1 and dependent claims 7 and 9. Applicant submits that new claim 16 is unobvious in view of Clarke for at least the same reasons previously argued for claim 1. Applicant takes the opportunity to comment on the novelty and non-obviousness of claim 16 over Clarke and combinations of Clarke in view of Grant.

The Examiner rejected claim 7 for being obvious in view of Clarke and claim 9 for being obvious in view of Clarke and Grant. The Examiner reasons that since Clarke has a regenerative frequency divider 116 for performing fractional multiplication of the frequency of the input signal received from the VCO 114, it removes any harmonic relationship between the final output frequency and the operating frequency of the VCO 114. The Examiner therefore asserts that the result of the regenerative frequency divider 116 can be achieved by harmonic subtraction filters as recited in claim 7 and harmonic rejection mixers as recited in claim 9. Applicant submits that Clarke does not teach or disclose the combination of harmonic rejection mixer and harmonic subtraction circuits within the circuit configuration described by claim 1.

While Clarke states that regenerative frequency divider 116 removes harmonic relationships between the final output frequency and the operating frequency of the VCO, Clarke only teaches that this is done with the mixer 124 and filter 128. No where does Clarke describe or teach that filter 128 can be replaced by harmonic subtraction circuits.

According to the description of the present application, paragraph [0065] describes how harmonics can be removed through the use of band pass filters or notch filters. Regardless of the type of filter being used, the purpose of a filter is to pass frequencies of a certain range by attenuating frequencies outside of the specified range. A subtraction circuit on the other hand actively subtracts one signal from another to provide the resulting difference between the two. This function of the recited subtraction circuits is generally described at paragraph [0069] of the present application. Applicant submits that Clarke does not disclose or teach any circuit analogous to the recited subtraction circuits for replacing filter 128.

Since harmonic subtraction circuits, and the combination of harmonic subtraction circuits with harmonic rejection mixers, are not described or taught in Clarke and Clarke in combination with Grant, Applicant submits that new claim 16 recites subject matter that is both novel and unobvious.

Amendment to the description

Paragraph [0082] of the description has been amended to clarify the circuit configuration shown in Figure 6 of the application. Applicant submits that no new matter is being added.

Therefore, Applicant submits that the application is in form for allowance, and favourable action to that end is respectfully requested.

The Commissioner is hereby authorized to debit \$60.00 from Deposit Account No. 501593, in the name of Borden Ladner Gervais LLP, representing a one month extension of time.

The Commissioner is hereby authorized to charge any additional fees, and credit any over payments to Deposit Account No. 501593, in the name of Borden Ladner Gervais LLP.

Respectfully submitted,

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